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(54) Title: A PROCESS FOR THE PREPARATION OF SOY BASED LOW-FAT AND HIGH PROTEIN SNACK

(57) Abstract: The present invention relates to a soy based ready-to-eat low-fat high protein snack food and a process thereof, said process comprising d ready-to-eat low-fat, high protein snack by blending in a ribbon blend, full fat soy flour (5-20 %) bengal gram flour (24-40 %) rice flour (18-20 %), chilli powder (0.5-0.7 %), salt (1.8-1.9 %), ajwain (0.5-0.7 %), baking powder (0.25-0.35 %) to obtain a dry mix, which, in turn, is mixed with water (25-30 %) in Hobart mixer to form a dough which is extruded into desired shape and thickness and baked for 15-60 minutes at a temperature range of 165-190 °C to finally obtain a product having protein content (24-25 %), fat (10-11.5 %).



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## A PROCESS FOR THE PREPARATION OF SOY BASED LOW-FAT AND HIGH PROTEIN SNACK

### Technical Field

5           The present invention relates to a soy based low-fat and high protein snack and a process for the preparation of soy based low fat and high protein snack.

### Background Art

10           Generally, manufacture of a snack food involves some form of extrusion of cereal/pulse dough followed by frying. Some times such products are also roasted for direct consumption, such as *papad*, or wafers. It is a common practice to add fat (shortening) to obtain the product crisp. In many developed countries they are usually prepared by high-pressure extrusion to achieve high degree of expansion. In India these are made by forming extrusion (or sheeting by rollers) optionally with addition of some leavening agents  
15 followed by deep-frying in oil or roasting, leading to a crisp product.

A few processes available for the production of low-fat products in different countries are described.

Reference may be made to, Lanner et al., 2000, The Procter & Gamble, Cincinnati, US patent No. GB 6033707 wherein a fried snack product is extruded and shaped into a  
20 design. The dough is formed by mixture of starch-based flour with a specific ratio of gelatinized starch and an amount of protein. The emulsifier keeps the integrity of the structure of the product. However, this product is deep-fried and may not result as a low-fat product.

Reference may be made to Reed et al., 1999, The Procter & Gamble, Cincinnati,  
25 US patent No.5922386, wherein a reduced fat, shaped snack product having light, crispy and crunchy texture is prepared. The product has the fat content of 20-38%. However, this product is starch flour based and the fat content in the product is much higher than in the present investigation.

Reference may be made to Lodge et al., 1995, The Procter & Gamble, Cincinnati,  
30 US patent No. 5464643, wherein a low-fat, shaped fried snack product having light, crispy and crunchy texture is prepared. The product is starch flour based with 3% hydrolyzed starch. The dough is formed and made into sheets and fried to provide a snack having 20-32% fat and having more flavors. However, the fat content in the product is much higher than in the present investigation and the product is not soy based.

Reference may be made to Villagran et al. 1994, The Procter & Gamble, Cincinnati, US patent NO. 5362511, wherein a fried snack food based on cereal grain having improved qualities are developed. The cereal grain based dough containing a protein is extruded and deep-fried to have reduced gumminess or tooth packing and  
5 grittiness. However, this product is deep-fried and may not result as low-fat product.

Reference may be made to Maegli-JW, 1994, Beatreme Foods, Beloit, WI, USA, US patent NO. 5298268, wherein, a low-fat, seasoned, cereal-based snack food having low moisture content by the use of an adhesive is described. However, this is not a soy-based snack.

10 Reference may be made to Finger-PJ and Eckhardt-D, 1994, Kernel Foods, London, NW-10 6EX, UK, UK patent No. GB 2270613A, wherein the method of making a snack food involves the preparation of dough from durum wheat flour and water, shaped, fried and cooled rapidly. The snack mentioned here is wheat based and not soy.

Reference may be made to Lodge RW and Allen CH 1993, The Procter & Gamble,  
15 Cincinnati, US patent N. 5188859, describing the process for preparing a low-fat snack with a light, crispy, crunchy texture, made from potato flour, sheeted, cut and coated with oil and cooked with hot air or superheated steam. The cooked snack contains 10-20% fat, having fried like texture and flavor. This product is prepared with potato flour and not soy.

The reference may be made to Young et al., 1992, The Procter & Gamble,  
20 Cincinnati, US patent No. 5171600, wherein a process for preparing a low-fat shaped snack product having a light, crispy texture prepared from 50-80% potato flour, sheeted and cut or extruded, fried to moisture of 5-15% and excess fat removed by superheated steam, resulting in a snack having 12-25% fat is described. However, this product is not soy based.

25 Reference may be made to Ueda et al., 1991, Otsuka pharmaceutical co. Lmt. Tokyo, Japan, US patent No. 505270, wherein, a high protein nutritive food which has a protein content of 40-85% (based on solids) is prepared by heating the dough under reduced pressure using soy proteins. However, the formulation and method of preparation is different from the present product.

30 Reference may be made to Gage et al 1988, The Procter & Gamble, Cincinnati, European patent No. EP 0287158A2, describing the preparation of extruded-cooked snack chips comprising corn, fat and water. The chips are lower in fat and higher in fibre than conventional snack chips containing up to 1% emulsifier, having light texture, an absorbent material for crunchiness. Process involves extrusion cooking to 60-80%

gelatinization and fried in shortening. However, this product is prepared by extrusion cooking and is corn based.

Reference may be made to Willard MJ, 1988, Willard, Idaho Falls, ID, USA, US patent N0. 4770891 wherein, an expanded fried cereal-based snack product are prepared  
5 from a low-water-absorbing component, a high-water-absorbing component and a starch component. The total dry solids are mixed with water to form dough, sheeted, cut into pieces and fried in hot oil to form a fried snack with low-fat content. This is totally a cereal-based snack product.

Reference may be made to Willard MJ, 1988, Willard, Idaho Falls, ID, USA, US patent  
10 N0. 4769253, for the preparation of an expanded fried cereal-based snack product is given comprising low-water-absorbing component, a high-water-absorbing component and a starch component, extruded and fried in hot oil, to get a low-fat snack. The snack that mentioned here is cereal based.

Reference may be made to Open Shaw and Toft 1987, D&S Bolton UK, UK patent  
15 N0. 2178637A, wherein, water is added to a mixture of wheat bran and ungelatinised starch and cooked to give a plastic mass, which is sheeted and cut. The cut pieces are fried in hot oil. The protein can be enhanced with caseinates, soy protein or wheat or corn gluten. The finished product has a high fibre content and fat more than or equal to 5%. The finished product is rich in fibre and starch based and soy is incorporated to increase the  
20 protein content.

Reference may be made to Willard MJ, 1986, Willard, Idaho Falls, ID, USA, US patent N0. 4623548, wherein, dough is prepared from low-water-absorbing component, a high-water-absorbing component and a starch component, mixed with water to form dough, extruded and fried to form a snack of low-fat content. However, the product mentioned here does not contain  
25 soy.

Reference may be made to Wiker and Cunningham, 1983, Kansas State University Research Foundation, Manhattan, KS, US patent No.4421770, wherein, a high protein snack food prepared from egg protein by involving a process of heat coagulation. The principal ingredient is starch in the batter mix. However, the product is not soy based and  
30 not a low-fat product.

Reference may be made to Howard AN, 1982, South African patent N0. ZA 81/7470, describing the method of preparation of crisps having low calorific value even when fried. They consist of discrete cooked portions of dough of gelatinized starch and cereal bran other than rice bran as a fiber. Oil content is preferentially 5-30%. These are  
35 mainly starch-based crisps and do not contain soy.

Reference may be made to Toft JG, 1980, Standard Brands Inco. US patent No. 4212892, wherein, a high protein extruded snack food comprising a plastic protein gel with dry potato/corn starch or flour is developed. The protein gel is prepared using fish and soybean. The snack food is nutritionally superior to potato chips, having protein level of 18-20%. However, this product is deep-fried and may not result as a low-fat product and the source of protein is from animal and plant sources. The product is prepared using pre gelled soy protein.

Reference may be made to Rockland LB and Radke TM, 1978, United States of America, Secretary of Agriculture US patent NO. 4124727, describing a process for preparing a legume based, nutritionally balanced protein food product. The process includes treating the seeds to render them quick cooking, cooking the seeds and mashing and mixing with methionine containing cereal flours, oil seeds etc., adding water to form a dough, extruded and fried in oil.

Reference may be made to Hahn DT, 1978, Ralston Purina Co. St. Louis MO, US patent NO. 4120988, wherein a protein based snack food having expanded and puffed texture using soy protein isolate are developed. Soy protein isolate is in the form of gel, which maintains the structural integrity of the product. However, the formulation is based on processed soy proteins

Reference may be made to Huelskamp et al. 1975, US patent NO.3911142, wherein, a process for preparing a protein snack food is described, consisting of soy protein, dried whey and dried skim milk, wheat flour, potato flakes, flavor etc., adding some of the water and dry mixing the ingredients and resting the mass and adding the remaining water, forming sheets of dough and cutting into shapes and baking the product followed by air dehydration. The dough pieces may be fried also.

Reference may be made to Blagdon et al., 1974, Ralston Purina Co. St. Louis, MO, US patent NO. 3849582, wherein, an aqueous mixture of a pre-gelatinized starch, soy protein isolate which has not been subjected to the gelling action of heat and a starch modifying and complex forming agent is shaped and fried to give a product with an improved crisp texture. However, this product is deep-fried and may not result in a low-fat product.

Reference may be made to Nestle SA, 1974, British patent NO. 1350547, for a product, containing dough compositions of 14-16% protein, are extruded, frozen, sliced and deep-fried. The product under consideration is a fried product, which will not be a low-fat product.

Reference may be made to Sato et al 1973 Japanese patent NO. 3843622, describes a process consisting of a mixture of soybean and vegetable materials. The mixture is steam heated to largely denature any gluten. Then it is cut to form pieces to be fried or roasted after being spray coated with oil.

5

### Object of the invention

The main object of the present invention is to provide soy based low-fat and high protein snack.

Another object of the present invention is to provide a process for the preparation of soy based low fat and high protein snack.

Another object of the present invention is to provide maximum level of utilization of soy flour in ready-to-eat snack formulation.

Another object of the present invention is to provide a low calorie snack.

### Summary of the Invention

The present invention relates to a soy based low-fat high protein snack and a process for the preparation of soy based low-fat and high protein snack from full fat soy flour, gram flour, rice flour, gelatinized starch, salt and spices.

### Detailed description of the Invention

Accordingly, the present invention provides a soy based low-fat and high protein snack having a protein content of 24-25% and fat content of 10-12%, said snack comprising of:

	i.	Full fat soy flour	5-20%,
25	ii.	Bengal gram flour	24-40%,
	iii.	Rice flour	18-20%,
	iv.	Gelatinized starch	4 - 5%,
	v.	Liquid fat	6 - 8 %,
	vi.	Salt	1.8 - 1.9%,
30	vi.	Chilli powder	0.5 - 0.7%,
	vii.	Ajwain powder	0.5 - 0.7%,
	viii.	Baking powder	0.25-0.35%
	ix.	Lecithin	0.25-0.35% and
	x.	Water	25- 30%

In an embodiment, the invention provides a low-fat high protein snack having calorific value in the range of 390-425 kJals.

Another embodiment of the invention provides a low-fat high protein snack having bulk density ranges between 0.45-0.55 g/cc and shear value in the range of 4.0 to 5.0  
5 Newton.

Still another embodiment of the invention provides a low-fat high protein snack having acceptable sensory level with respect to color, appearance, taste and overall on a 5-point hedonic scale with 10 trained panelists

One more embodiment of the invention provides a process for the preparation of  
10 soy based low fat and high protein snack, the said process comprising:

- a) blending the following ingredient thoroughly to obtain an uniform dry mix,

	<b>INGREDIENTS</b>	<b>Wt (%)</b>
	i. Full fat soy flour	5-20%
15	ii. Bengal gram flour	24-40%
	iii. Rice flour	18-20%
	iv. Gelatinized starch	4 - 5%
	v. Salt	1.8 - 1.9%
	<b>Spices</b>	
20	vi. Chilli powder	0.5 - 0.7%
	vii. Ajwain powder	0.5 - 0.7%
	<b>Minor ingredients</b>	
	viii. Baking powder	0.25-0.35%

- 25 b) dissolving lecithin in liquid fat,  
c) mixing with water the ingredients of steps (a) and (b) to obtain a dough,  
d) extruding dough of step (c),  
e) cutting and stranding the extruded dough of step (d) into desired shape and thickness,  
30 f) baking the extruded strands of step (e) and  
g) sorting and packing of final baked product having low-fat, high protein snack.

In an embodiment, blending is performed using ribbon blender.

In one embodiment, mixing is performed using a Hobart mixer.

In another embodiment, extrusion of dough is carried out to obtain 3-mm thickness  
35 sheets of the dough.



In yet another embodiment, cutting and stranding of dough is performed to obtain 30-50 mm pieces.

In still another embodiment, baking is performed at a temperature range of 165°-190° C for a period of 15-60 minutes.

5 In still yet another embodiment, the product obtained has protein content of 24-25%.

In an embodiment, the product obtained has a fat content of 10-12%.

In another embodiment, the product has calorific value of 390-425 kcals.

In one another embodiment, the product has bulk density of 0.45-0.55 g/cc.

10 In an embodiment, the product has shear value in the range of 4.0 to 5.0 Newtons.

In a further embodiment, the product obtained has acceptable sensory level with respect to color, appearance, taste and overall on a 5-point hedonic scale with 10 trained panelists.

#### Novelty

15 Novelty steps of this invention are the development of a new process for the preparation of a low-fat and high protein ready-to-eat snack.

- The novelty of the formulation and process is that the addition of high percentage of full fat soy flour in such a manner, which does not affect the sensory profile (acceptable) of the product.
- The formulation and process is such that the final product remains a low-calorie snack without affecting the sensory profile.
- The formulation contains high percentage of full fat soy flour and Bengal gram flour because of which the product has high protein content (24-25%)
- 25 • The product contains low-fat (10-11.5%), since baking was adopted in place of deep fat frying.
- Full fat soy flour has been used at high proportion (20%) in the formulation.
- The product has a calorific value of 390-425 kcals.
- The formulation gives a ready to eat product.

30 The snack prepared by this process is less expensive compared to commercially available snacks of this nature.

The process is further illustrated by the examples given below, which should not  
35 however be construed to limit the scope of the invention.

**Example 1**

A process for the preparation of ready-to-eat high protein low-fat snack

Ingredients	Wt(%)
Full fat soy flour	6.31
Raw bengalgram powder	37.87
Rice flour	18.93
Chilli powder	0.63
Ajwan seeds	0.63
Baking powder.	0.32
Vanaspathi	6.30
Salt	1.89
Lecithin	0.32
Water.	26.80

- 5 One of the major ingredients, the full fat soy flour was incorporated at  $\approx 6.3\%$  level of the mix. 100g full fat soy flour of 44 mesh size was mixed with 600g raw Bengal gram powder, 300g rice flour, 30g salt, 10g ajwan seeds and 5g baking powder. All the ingredients were mixed well. To the dry mix 100g vanaspathi and 5g lecithin were added.
- 10 All the ingredients were mixed and made dough with 425-ml water. The dough was then extruded to a noodle like shape and cut to 3-cm length. The ready-to-eat snack was then baked at 170 C for 20 minutes.

**EXAMPLE-2**

- 15 A process for the preparation of ready-to-eat high protein low-fat snack

Major Ingredients	%
Full fat soy flour	12.43
Raw bengalgram powder	31.10
Rice flour	18.65
Chilli powder	0.62
Ajwan seeds	0.62
Baking powder.	0.31
Vanaspathi	6.20
Salt	1.86
Lecithin	0.31
Water.	27.90

- As one of the major ingredients, the full fat soy flour was incorporated at  $\approx 12.4\%$  level. 200g full fat soy flour of size 44 mesh size was mixed with 500g raw Bengal gram powder,
- 20 300g rice flour, 30g salt, 10g ajwan seeds and 5g baking powder. All the ingredients were

mixed well. To the dry mix 100g vanaspathi and 5g lecithin were added. All the ingredients were mixed and made dough with 450-ml water. The dough was then extruded to a noodle like shape and cut to 3-cm length. The ready to eat snack was then baked at 175 C for 20 minutes.

5

**EXAMPLE-3**

A process for the preparation of ready-to-eat high protein low-fat snack

Ingredients	Wt(%)
Full fat soy flour	18.05
Raw bengalgram powder	24.25
Rice flour	18.10
Chilli powder	0.60
Ajwan seeds	0.60
Baking powder.	0.30
Vanaspathi	6.00
Salt	1.80
Lecithin	0.30
Water.	30.00

As one of the major ingredients, the full fat soy flour was incorporated at 18.0% level. 300g full fat soy flour of size -44mesh size was mixed with 400g raw Bengal gram powder, 300g rice flour, 30g salt, 10g ajwan seeds and 5g baking powder. All the ingredients were mixed well. To the dry mix 100g vanaspathi and 5g lecithin was added. All the ingredients were mixed and made dough with 500 ml water. The dough was then extruded to a noodle like shape and cut to 3 cm length. The ready to eat snack was then baked at 175 C for 22 minutes. The product, 1000g of sev was obtained.

15

**EXAMPLE-4**

A process for the preparation of ready-to-eat high protein low-fat snack

Ingredients	Wt (%)
Full fat soy flour	18.10
Raw bengalgram powder	24.20
Rice flour	
plain	13.58
gelatinised	4.52
Chilli powder	0.60
Ajwan seeds	0.60
Baking powder.	0.30
Vanaspathi	6.00
Salt	1.80
Lecithin	0.30
Water.	30.00

Inclusion of gelatinized rice flour in the formulation was made to improve the texture of the product. As one of the major ingredients, the full fat soy flour was incorporated at 18.0% level. 300g full fat soy flour of size -44mesh size was mixed with 400g raw Bengal gram powder, 300g rice flour, 30g salt, 10g Ajwan seeds and 5g baking powder. All the ingredients were mixed well. To the dry mix 100g vanaspathi and 5g lecithin were added. All the ingredients were mixed and made dough with 500ml water. The dough was then extruded to a noodle like shape and cut to 3-cm length. The ready to eat snack was then baked at 180 C for 20 minutes. The product, 980g of sev was obtained.

#### EXAMPLE-5

A process for the preparation of ready-to-eat high protein low-fat snack

Ingredients	Wt(%)
Full fat soy flour	12.40
Raw bengalgram powder	31.10
Rice flour	
Plain	14.11
Gelatinised	4.66
Chilli powder	0.62
Ajwan seeds	0.62
Baking powder.	0.31
Vanaspathi	6.20
Salt	1.86
Lecithin	0.31
Water	27.90

As one of the major ingredients, the full fat soy flour was incorporated at 12.4% level. 200g full fat soy flour of size 44 mesh size was mixed with 500g raw bengal gram powder, 300g rice flour, 30g salt, 10g ajwan seeds and 5g baking powder. All the ingredients were mixed well. To the dry mix 100g vanaspathi and 5g lecithin were added. All the ingredients were mixed and made dough with 450 ml water. The dough was then extruded to a noodle like shape and cut to 3 cm length. The ready-to-eat snack was then baked at 180 C for 22 minutes. The product, 930g of sev was obtained.

## Claims

- 1) A soy based low-fat and high protein snack having a protein content of 24-25% and fat content of 10-12%, said snack comprising of:
- |    |                        |                |
|----|------------------------|----------------|
| 5  | i. Full fat soy flour  | 5-20%,         |
|    | ii. Bengal gram flour  | 24-40%,        |
|    | iii. Rice flour        | 18-20%,        |
|    | iv. Gelatinized starch | 4 - 5%,        |
|    | v. Liquid fat          | 6 - 8 %,       |
| 10 | vi. Salt               | 1.8 - 1.9%,    |
|    | vi. Chilli powder      | 0.5 - 0.7%,    |
|    | vii. Ajwain powder     | 0.5 - 0.7%,    |
|    | viii. Baking powder    | 0.25-0.35%     |
|    | ix. Lecithin           | 0.25-0.35% and |
| 15 | x. Water               | 25- 30%        |
- 2) The low-fat high protein snack as claimed in claim 1, is having calorific value in the range of 390-425 kcal.
- 3) The low-fat high protein snack as claimed in claim 1 has bulk density ranges between 0.45-0.55 g/cc.
- 20 4) The low-fat high protein snack as claimed in claim 1 has shear value in the range of 4.0 to 5.0 Newtons.
- 5) The low-fat high protein snack as claimed in claim 1 has acceptable sensory level with respect to colour, appearance, taste and overall on a 5-point hedonic scale with 10 trained panelists
- 25 6) A process for the preparation of soy based low-fat and high protein snack as claimed in claim 1, the said process comprising stepsof:
- a) blending the following ingredients thoroughly to obtain an uniform dry mix,
- |    |                         |               |
|----|-------------------------|---------------|
|    | <b>INGREDIENTS</b>      | <b>Wt (%)</b> |
|    | i. Full fat soy flour   | 5-20%         |
| 30 | ii. Bengal gram flour   | 24-40%        |
|    | iii. Rice flour - plain | 18-20%        |
|    | iv. Gelatinized starch  | 4 - 5%        |
|    | v. Salt                 | 1.8 - 1.9%    |
|    | <i>Spices</i>           |               |
| 35 | vi. Chilli powder       | 0.5 - 0.7%    |

vii. Ajwain powder	0.5 - 0.7%
<i>Minor ingredient</i>	
viii. Baking powder	0.25-0.35%

- 5      b) dissolving lecithin in liquid fat,
- c) mixing with water the ingredients of steps (a) and (b) to obtain a dough,
- d) extruding dough of step (c),
- e) cutting and stranding the extruded dough of step (d) into desired shape and thickness,
- 10     f) baking the extruded strands of step (e), and
- g) sorting and packing of final baked product having low-fat, high protein snack.
- 7)     The process as claimed in claim 6, wherein in step (a) blending is performed using ribbon blender.
- 15    8)     The process as claimed in claim 6, wherein in step (a) the rice flour used is either plain or gelatinized.
- 9)     The process as claimed in claim 6, wherein in step (c) mixing is performed using a Hobart mixer.
- 10)    The process as claimed in claim 6, wherein in step (d) extrusion of dough is carried out to obtain 3mm-thickness sheet of the dough.
- 20    11)    The process as claimed in claim 6, wherein in step (e) cutting and stranding of dough is performed to obtain 30-50 mm pieces.
- 12)    The process as claimed in claim 6, wherein in step (f) baking is performed at a temperature range of 165°-190° for a period of 15-60 minutes.
- 25    13)    The process as claimed in claim 6, wherein in step (g), the product obtained has protein content of 24-25%.
- 14)    The process as claimed in claim 6, wherein in step (g), the product obtained has a fat content of 10-12%.
- 15)    The process as claimed in claim 6, wherein in step (g) the product has calorific value of 390-425 kcals.
- 30    16)    The process as claimed in claim 6, wherein in step (g) the product has bulk density of 0.45-0.55 g/cc.
- 17)    The process as claimed in claim 6, wherein in step (g) the product has shear value in the range of 4.0 to 5.0 Newton.

- 18) A process as claimed in claim 6, wherein in step (g) the product obtained has acceptable sensory level with respect to color, appearance, taste and overall on a 5-point hedonic scale with 10 trained panelists

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 02/01154

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23L1/20 A23L1/305 A23L1/164 A23L1/217 A23L1/36

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA, BIOSIS, MEDLINE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 375 006 A (UNILEVER PLC ;UNILEVER NV (NL)) 27 June 1990 (1990-06-27) page 2, line 20 -page 3, line 29 ---	1,3, 6-14,16
A	US 5 296 253 A (LUSAS EDMUND W ET AL) 22 March 1994 (1994-03-22) column 1, line 14 -column 2, line 4 column 3, line 10 - line 58 column 9, line 51 -column 10, line 29 ---	1,3, 6-14,16
A	US 4 124 727 A (ROCKLAND LOUIS B ET AL) 7 November 1978 (1978-11-07) cited in the application example 2 column 4, line 18 -column 6, line 20 --- -/-	1,3, 6-14,16

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*S\* document member of the same patent family

Date of the actual completion of the international search

15 November 2002

Date of mailing of the international search report

09/12/2002

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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 02/01154

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/034574 A1 (BEHARRY CHRISTOPHER RANDALL ET AL) 21 March 2002 (2002-03-21) paragraphs '0049!', '0058!', '0060!', '0073!', '0087!', '0101!', '0102!', '0107! paragraphs '0139!', '0147!', '0151!	1, 3
A	US 3 911 142 A (HUELSKAMP HENRY J ET AL) 7 October 1975 (1975-10-07) cited in the application column 1, line 22 -column 2, line 68	1, 3, 6-14, 16
T	ANONYMOUS: "Cicer arietinum L." , 'Online! 13 June 2001 (2001-06-13), XP002220469 Retrieved from the Internet: <URL:http://www.1ldis.org/LegumeWeb/6.00/t axa/2827.shtml> 'retrieved on 2002-11-07! page 1	
T	LORI ALDEN: "Indian spices" , 'Online! XP002220470 Retrieved from the Internet: <URL:http://www.foodsubs.com/SpiceInd.html > 'retrieved on 2002-11-07! page 1	
T	ANONYMOUS: "Standard view of a Hobart(R) mixer" , 'Online! XP002220471 Retrieved from the Internet: <URL:http://www.food-equipment.com/mcbig.g if> 'retrieved on 2002-11-08! the whole document	

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB 02/01154

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☒ Claims Nos.: 2, 4, 5, 15, 17, 18  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; It is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 2,4,5,15,17,18

Some of the terms used in the dependent claims 2 and 15 generates confusion on their meaning. The calorific value can yield different values depending on the method employed (caloric bomb, calculus etc.) Additionally, the values indicated in these claims are incompletely referred (units are kcal without any reference made to the mass of the product taken into account). As consequence, the definition of the subject-matter of claims 2 and 15 is unclear (Article 6 PCT).

The claims 4 and 17 contain a feature, namely "shear value", that, although supported by the description, don't allow a person skilled in the art to carry out this part of the invention because some essential parameters (temperature, type of device etc.) have been not disclosed contrary to Article 5 PCT.

Claims 5 and 18 do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The following functional statements do not enable the skilled person to determine which technical features are necessary to perform the stated functions: "... the product obtained has acceptable sensory level with respect to colour, appearance, taste and overall on a 5-point hedonic scale with 10 trained panellists". An attempt is made to define the method and the product by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 02/01154

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0375006	A	27-06-1990	AT 102444 T	15-03-1994
			AU 606302 B2	31-01-1991
			AU 4694489 A	28-06-1990
			CA 2005710 A1	21-06-1990
			DE 68913684 D1	14-04-1994
			DE 68913684 T2	21-07-1994
			EP 0375006 A2	27-06-1990
			ES 2050788 T3	01-06-1994
			US 5080914 A	14-01-1992
US 5296253	A	22-03-1994	NONE	
US 4124727	A	07-11-1978	NONE	
US 2002034574	A1	21-03-2002	AU 5342101 A	30-10-2001
			WO 0178523 A2	25-10-2001
US 3911142	A	07-10-1975	NONE	